IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: **Phillips et al.**	Atty Docket No.: **78384 18-32 US DIV1**
Serial No. **10/706,142**	Art Unit: **1732**
Filing Date: **November 12, 2003**	Examiner: **Mathieu D. Vargot**
Confirmation No. **6069**	
For: **Methods for Forming Security Articles Having Diffractive Surfaces and Color Shifting Backgrounds**	

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DECLARATION UNDER 37 C.F.R. 1.132 OF GARTH ZAMBORY

I Garth Zambory reside at 9402 Cleat Court in Burke, Virginia.

I graduated from the University of Waterloo located in Waterloo, Ontario, Canada in 1981 with an Honors Bachelor of Mathematics.

Work History: I am currently employed by JDSU, Flex Products Group and am the Product Line Manager with overall responsibility for development and sales of high security features & products for currency and federally issued identity documents. These products include optically variable pigment, color shifting inks, covert taggants as

well as ChromaGrams. Prior to working for JDSU I was employed for 3 years at Digimarc Corporation where I was the Director of Business Development for the federally issued identity documents. In this role I was responsible for the determination, selection and integration of both overt and covert security features on documents such as passports, visas and national ID cards including various holographic structures. Prior to working with Digimarc I was employed at De La Rue for 6 years, including my time with Currency Systems International that was acquired by De La Rue during my employment. I held various positions with De La Rue as I worked in a number of different divisions handling product development and sales of currency authentication devices, high security paper and security printing. All of these positions involved either the authentication of documents utilizing holographic features, machine detection of holographic features and product development (such as with banknote security thread) that utilized and specified holographic security features. My work at all of these companies was in the field of overt and covert security features, including work directly related to the subject matter of US patent application 10/706,142

I am a person skilled in the art of thin film optical structures such as those claimed in U.S. patent application 10/706,142 referred to hereafter as the '142 application.

I have reviewed the prosecution history of U.S. patent application 10/706,142 including the prior art reference United States Patent 5,700,550 in the name of Uyama et al.,

entitled Transparent Hologram Seal, referred to hereafter as the '550 patent.

I have compared the structure defined in the pending claims of the '142 application with the teachings found within the cited '550 patent.

Claim 1 of the '142 patent application clearly recites a method of forming two structures on opposite sides of a light transmissive substrate; a hologram or grating on one side of the substrate and a color shifting structure on a second side of the substrate.

There is no suggestion in the '550 patent to a method of forming a color shifting structure and hologram on opposite sides of a light transmissive substrate. In fact, the '550 patent teaches only having a color shifting structure and hologram on a same side of a light transmissive substrate.

Furthermore, I have examined the claimed structure formed by the method in the pending '142 application shown in Exhibits A-E and they inherently produce significantly different visual effects than the structure taught in the '550 patent as discussed more hereinafter. Specifically, each of Exhibits A-E has two different side by side samples. The samples shown on the right side of each Exhibit are coated on the same side of the substrate as taught by the '550 patent. Each sample shown on the left side of each Exhibit is coated on the opposite sides of the substrate (i.e. hologram and coating on opposite sides of the substrate as claim in the above identified application. The side by side samples of each Exhibit were prepared so

that each side by side pair was prepared using the same coating material and the same thickness, the only difference being the separation by the substrate.

With regard to the claimed invention in the '142 application, the light transmissive substrate inherently serves as a "decoupling layer" to substantially separate the holographic effects from the color shifting effects, whereas the holographic effects and color shifting effects in the prior art will always intimately interact/interfere with each other as they share a common boundary layer.

This can be seen from the samples of Exhibit A. The color shifting coating on both side-by-side samples are seen through the substrate, however there are significant differences in visual appearance between the two depending on whether the hologram is situated spaced apart from or in intimate contact with the color shifting coating.

Exhibit A, (Sample 2) is 5 layer all dielectric patterned after Uyama on flat and on embossed side of substrate.

Exhibit B, (Sample 3) is an Absorber/Dielectric/Reflector on flat and on embossed side of substrate.

Exhibit C, (Sample 4) is an Absorber/Dielectric/Reflector on flat and on embossed side of substrate.

Exhibit D, (Sample 5) is a 7 layer all dielectric patterned after Uyama on flat and on embossed side of substrate.

Exhibit E, (Sample 6) is a 7 layer all dielectric patterned after Uyama on flat and on embossed side of substrate.

OBSERVATIONS:

I have carefully examined samples 2a and 2b in Exhibit A and have observed that there is a significant visible difference between the samples 2a and 2b. When the color shifting coating is on the opposite side of the substrate from the hologram the overall effect of the hologram is greatly subdued at all viewing angles in daylight (both direct sunlight and typical indoor lighting) conditions.

Examination of samples 3a and 3b results in perhaps the most dramatic display of the differences resulting from whether the color shifting coating is applied on the same or opposite side of the substrate to that of the hologram. My examination took place under normal office lighting conditions. The first observation is that the holographic images are rotated 180 degrees with respect to each other depending on which side the color shifting coating is applied. When the color shifting coating is on the opposite side of the substrate from the holographic embossing, as it is in sample 3a, there is a tipping wine glass or jug that appears to be pouring wine into a smaller wine glass on its left. This same feature appears to be flipped in the horizontal axis when the color shifting coating is applied directly to the embossing, as shown in sample 3b. In sample 3b, the smaller wine glass remains to the left of the tipping glass or jug but they appear "upside down" as compared to the same feature in sample 3a. Another difference between samples 3a and 3b is that when the color shifting coating is applied to the opposite side of the substrate from the holographic embossing, as in sample 3a, there are viewing angles in which the holographic effect disappears completely. When tilting the leneta card from side to side there are two relatively shallow viewing

angles on either side of normal where the holographic effect in sample 3a disappears and the material appears to be solid green in color. At the same angle in sample 3b the holographic effect remains visible even though it is subdued. A similar effect can be seen when tilting the top of the leneta card away from the viewer with the holographic effect in sample 3a disappearing and the material appearing blue in color.

Sample 4 shows the same effects as those described above for sample 2.

Sample 5 shows a similar effect to one described in sample 3 above; namely that of the holographic feature disappearing when sample 5a is viewed at various angles. In this case (sample 5a) where the color shifting coating is again on the opposite side on the substrate to the holographic embossing the holographic image disappears when the leneta card is tiled from left to right as well as when the top of the card is tiled away from the viewer. At these same viewing angles the holographic image remains visible in sample 5b.

Examination of samples 6a and 6b once again show that the effects of the holographic images being rotated 180 degrees to each other depending on whether the color shifting coating is on the same or opposite side of the substrate as the holographic embossing as described above for sample 3. An additional observation is that the wine barrel is significantly more visible in sample 3a as compared to that of sample 6a.

CONCLUSIONS:

From the above observations it is clear that there are significant differences in the optical effects of a device that combines a color shifting structure, a clear substrate and a holographic structure depending on whether the color shifting structure is on the same or opposite side of the clear substrate to the holographic structure.

The clear substrate, when placed between the color shifting and holographic structures, decouples the effects of color shift and hologram to an unexpected degree.

In my experience there are two very important advantages to the different effects seen in the (a) samples wherein the color shifting coating is on the opposite side of the substrate from the hologram.

- For example in the image of a wine glass in 3a, made with the color shifting coating and hologram on opposite sides of the substrate, there are angles of view where only the thin film color is seen. In particular, there is a green color at angle where no diffraction in seen. This provides a particular, and somewhat unique, form of security not found in the type of structure wherein the color shifting layers and hologram are on the same side, in that the device flips from a diffractive image to only a thin film image (due to decoupling). Such a security feature, where the holographic image completely disappears at a discrete angle, would be more difficult to simulate or

counterfeit than a feature in which the color shift and holographic effects we always both present, as is the case in sample 3b.

- As I have observed, the image in sample 2a of Exhibit A, which has the color shifting coating on an opposite side of the substrate from the hologram has an image that is more muted than that of sample 2b made by having the hologram and color shifting layers on the same side of the substrate. From my experience, more muted images and colors are more difficult to simulate. That is why pastel colors are often used on banknotes and other high security documents. Color printers and other devices such as scanners, cameras and related output devices have a harder time to accurately replicate a muted color in comparison to a highly bright, high chroma sample. Thus, sample 2a is more difficult to counterfeit than the image seen in sample 2b.

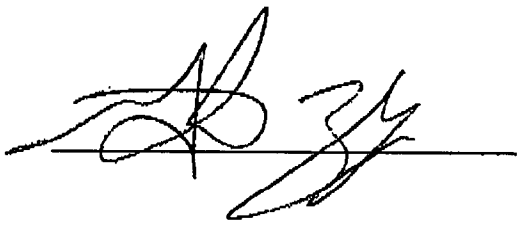
From my experience, another advantage of having the color shifting and holographic structures on opposite sides of the substrate is in the manufacturing process. It is easier to manufacture a color shifting structure in a vacuum roll coater where the target substrate is smooth, as with the clear substrate, as compared to depositing the color shifting structure on the rough holographic structure.

And further deponent saith not.

The undersigned declares that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further

that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signed at Burke, Virginia on 26 April, 2007



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